ATTACHMENT D

HEIGHT MODERIZATION STATION SELECTION GUIDELINES

Generally, station selection shall be based on the following criteria. Specific requirements are project dependent and the following criteria will be supplemented by those project-specific requirements.

Unless specified otherwise, the overall Height Mod project shall consist of stations spaced on average approximately 5 km apart. The actual station spacing shall be flexible enough to allow for optimum station selection but may not exceed the spacing limits specified in NOS-NGS-58.

Horizontal control stations shall be distributed in accordance with NOS-NGS-58. Vertical control staions shall be distributed in accordance with the "Guidelines for Establishing GPS-Derived Orthometric Heights." Existing survey monuments that don't qualify as horizontal or vertical control may be used for local network stations instead of setting new marks. In fact, it is preferred that existing marks be used, as it saves the time and expense of setting new monuments, as long as the existing monument meet the criteria listed below.

The following are a list of considerations for every monument (new or old, control station or local network station) in the project. The intent is to ensure that stations will be stable and usable years after the survey is completed. Each of the considerations are important, and so, they are not prioritized.

* Adequate GPS satellite visibility (unrestricted at 15 degrees above the horizon). Minor obstructions may be acceptable, but must be depicted on the Visibility Obstruction Diagram.

* Accessable by vehicle (two-wheel drive preferred).

* Stability, bedrock being most preferred. See below.

* Permanency.

* Ease of recovery.

* Minimal multi-path.

* Appropriate geographic location and spacing.

* Location allows efficient use by surveying community.

* Accessable by public. Public property should be utilized where feasible.

* No known potential conflict with future development.

* Aerial-photo identifiable.

Stability

Stability quality codes A, B, C, and D are defined in the Blue Book, Volume 1, Annex I, with examples given below. Only codes A and B are recommended, however concrete posts may be selected with code C stability if the mark is deemed stable from review of soil conditions and average frost depth.

Quality code A = expected to hold an elevation. Examples: rock outcrops; rock ledges; bedrock; massive structures with deep foundations; large structures with foundations on bedrock; or sleeved deep settings (10 feet or more) with galvanized steel pipe, galvanized steel, stainless steel, or aluminum rods.

Quality code B = probably hold an elevation. Examples: unsleeved deep settings; massive retaining walls; abutments and piers of large bridges or tunnels; unspecified rods or pipe in a sleeve less than 10 feet; or sleeved copper-clad steel rods.

Quality code C = may hold an elevation but subject to ground movement. Examples: Metal rods with base plates less than 10 feet deep; concrete posts (3 feet or more deep); large boulders; retaining walls for culverts or small bridges; footings or foundation walls of small to medium-size structures; or foundations such as landings, platforms, or steps.